

FEDERAL AVIATION ADMINISTRATION DATA MANAGEMENT STRATEGY

Version 1.0



**Prepared by the:
Information Management Division
Office of the Assistant Administrator for Information Services
and Chief Information Officer**

September 21, 1999

**Data Management
Report to Congress and Strategy**

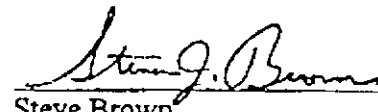
We, the undersigned, agree to the content of the FAA's Data Management report to Congress and also to the content and execution of the FAA's Data Management Strategy, as detailed in the attached documents.



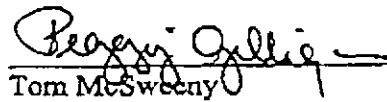
Dan Mehan
Assistant Administrator for
Information Services and CIO, AIO-1



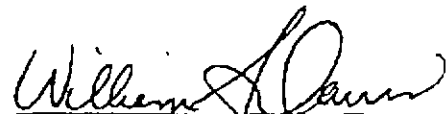
Steve Zaidman
Assistant Administrator for
Research and Acquisitions, ARA-1



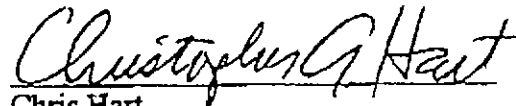
Steve Brown
Deputy Associate Administrator for
Air Traffic Services, ATS-1



Tom McSweeney
Associate Administrator for
Regulation and Certification, AVR-1



Cathal Flynn
Associate Administrator for
Civil Aviation Security, ACS-1



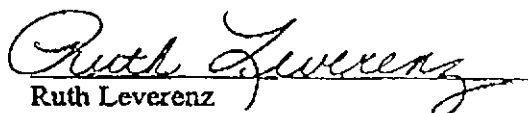
Chris Hart
Assistant Administrator for
System Safety, ASY-1




Donna McLean
Assistant Administrator for
Financial Services, ABA-1



for Glenda M. Tate
Assistant Administrator for
Human Resource Management, AHR-1



Ruth Leverenz
Assistant Administrator for
Region and Center Operations, ARC-1



David F. Traynham
Assistant Administrator for
Policy, Planning, and Intl. Aviation, API-1

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1 Executive Summary

This Federal Aviation Administration (FAA) Data Management Strategy provides the guiding principles and framework for implementing a corporate data management program. Future aviation depends upon modernized and highly unified services to maintain safe, secure, and efficient flight in the face of expected growth. Effective data management lies at the core of these services in support of the FAA's mission.

As with many large public and private organizations, the FAA's information systems have evolved over the past 20 to 30 years to meet specific requirements. This has led to a proliferation of data, much of which is redundant or obsolete. As a result, FAA data is difficult to share, costly to assemble, and hard to assess in terms of integrity and accuracy. At the same time, there is an increasing need to share information externally with domestic air carriers, international civil aviation administrations, Congress, and the flying public.

There is general agreement that the FAA should implement a corporate data management program, but few public or private organizations have successfully done so. Most efforts fail because they are too broad in scope, lack commitment, and grossly underestimate resource requirements. The FAA data management program, therefore, needs to be narrowly focused on the areas with the greatest potential benefits for the agency. The process should be evolutionary with emphasis on collaboration where it makes sense, standardization on core data elements, better communication along the information chain, and discrete projects that address the areas of greatest need. The lines-of-business (LOBs) will work with the Assistant Administrator for Information Services and Chief Information Officer (AIO) to implement this Data Management Strategy and subsequent program.

The following guiding principles represent the vision for the FAA data management program:

- Data is viewed as a corporate resource used to make informed business decisions.
- Data is available in a timely, easily accessible, and understandable format to all users who need it.
- Core data is standardized for increased interoperability and increased accuracy.
- Maintenance and development costs are reduced by eliminating redundant and obsolete data, and through data reuse.
- Data development is coordinated across LOBs using a standardized methodology.
- Data is managed throughout its life-cycle from creation to disposition.
- AIO is the focal point for corporate data management activities.

The primary goal of the FAA data management program is to make reliable information available quickly. The specific goals needed to achieve this are:

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- Establish a corporate data management program managed by AIO;
- Increase data sharing;
- Improve data availability in terms of timeliness, access, and quality;
- Promote collaboration on data management activities;
- Establish a corporate data architecture;
- Leverage the existing data infrastructure.

The agency will carry out a three phased approach to establishing a data management program. The following table summarizes the key objectives to implement this program by phase:

Phase I (04/99 – 09/00)	Phase II (10/00 – 09/01)	Phase III (10/01 – 09/03)
<ul style="list-style-type: none">• Obtain consensus on Strategy.• Identify core data elements for external customers.• Report to Congress on program.• Establish a data management forum.• Establish an inventory of databases.	<ul style="list-style-type: none">• Identify core data elements for internal customers.• Establish database certification process.• Establish data stewards.• Develop interfaces to legacy systems data.• Begin to identify and retire obsolete data.• Establish a metadata repository.• Identify data that needs to be shared agency-wide.	<ul style="list-style-type: none">• Enhance the metadata repository.• Continue to identify and retire obsolete data.• Make shared data available in a timely manner.

The general strategies or approaches that can be employed to achieve the above objectives are summarized in the following table:

STRATEGY	SUMMARY
Data Management Program Implementation	AIO will serve as the focal point for the FAA data management program. The focus areas will be on corporate data issues, facilitation, and policy development.
Data Sharing	Core data elements that need to be shared will be identified and standardized. An orderly process will be established for creating and maintaining corporate data standards.
Data Availability	Develop, maintain, and provide access to agency data, the data architecture, and standards. Establish and provide agency information access services.
Communications	AIO will establish a Data Management Forum under the auspices of the Joint Resources Council. The Data Management Forum will serve as a clearinghouse for corporate data management issues, and will establish threshold criteria for the data that is to be reviewed.
Corporate Data Architecture	A corporate data architecture will be built around the core data elements. Implicit in this strategy is adoption of interoperable data management tools and standard methodologies. AIO will manage the architecture and all associated processes and activities.
Leveraging Existing Systems and Methodologies	LOB “best practices” in data management will be leveraged by the agency for the corporate data management program. Data elements in mission critical legacy systems will be cataloged using automated data

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	management tools, redundant data will be eliminated where feasible, and a corporate metadata repository will be developed from this information.
Data Life-Cycle Management	A life-cycle management approach will be adopted for agency data. A single point of accountability or data steward will be established for core agency data. The data steward will be responsible for managing the data throughout its life cycle.

2 Purpose

This Federal Aviation Administration (FAA) Data Management Strategy provides the guiding principles and framework for implementing a corporate data management program. Future aviation depends upon modernized and highly unified services to maintain safe, secure, and efficient flight in the face of expected growth. Effective data management lies at the core of these services, which support the FAA's mission, goals, and objectives. This strategy was developed in collaboration with the lines-of-business (LOBs), and represents an agency-wide approach to establishing sound data management practices across the organization. This strategy supports the Information goal of the FAA 2000-2002 Information Technology Strategic Plan.

3 Strategic Drivers

Airline passengers are projected to increase from 574 million in 1996 to 926 million in 2008.¹ The FAA will not be able to meet future business needs with its current data environment. The National Airspace System (NAS) is becoming too complex to manage intuitively or on a system-by-system basis. For example, aviation users want more flexibility through a "free flight" concept, and future administrative systems will require access to operational data to achieve the agency goal of implementing a cost accounting system. In its present form, however, the agency's data is too dispersed and inconsistent to be used effectively to meet our current and future business needs.

4 Background

4.1 Strategic Context

The FAA is the element of the U.S. government with primary responsibility for the safety of civil aviation and commercial space transportation as part of the worldwide aerospace community. All FAA data should be directly traceable to the support of the agency strategic goals and objectives. This traceability is critical to the rationalization and validation of all data development and maintenance activities. The FAA strategic goals are:

- **Safety**
By 2007, reduce U.S. aviation fatal accident rates by 80 percent from 1996 levels.
- **Security**
Prevent security incidents in the aviation system.
- **System efficiency**

¹ FAA Fiscal Year 2000 Annual Performance Plan; <http://www.faa.gov/aba/pdf/00apfnd8.pdf>

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Provide an aerospace transportation system that meets the needs of users and is efficient in the application of FAA and aerospace resources.²

The FAA strategic goals and environment define the boundaries of and shape the requirements for the data management program. This alignment ensures that the Data Management Strategy supports the business needs and mission priorities of the agency and its customers. The data management program must be validated continuously to ensure the value added to the services, activities, and functions of both the FAA and the aviation industry.

The following table shows the primary FAA services and corresponding major functions the FAA performs to implement the agency's strategic goals in support of its mission. FAA systems and data are developed to support the major functions and services listed in the table. The table illustrates categories of data as well as areas where corporate data sharing is needed.

Major Functions ³	Services ⁴					
	Air Traffic	Airport Mgmt.	Security	Safety	Certification	Enterprise Mgmt.
Regulating civil aviation to promote safety and fulfill the requirements of national defense.	X		X	X	X	X
Encouraging and developing civil aeronautics, including new aviation technology.	X	X	X	X	X	X
Developing and operating a common system of air traffic control and navigation for both civil and military aircraft.	X	X		X	X	X
Research and development with respect to the National Airspace System (NAS) and civil aeronautics.	X	X	X	X		X
Developing and implementing programs to control aircraft noise and other environmental effects of civil aviation.				X	X	X
Regulating U.S. commercial space transportation.					X	X

² 1998 FAA Strategic Plan; <http://api.hq.faa.gov/apo120/98sp-fin.pdf>

³ An Overview of the FAA Today; <http://www.faa.gov/overview.htm>

⁴ NAS Technical Architecture Pathfinder, August 1999

4.2 Data Management Context

As with many large public and private organizations, the FAA's information systems have evolved over the past 20 to 30 years to meet specific requirements. Past practice has led to a proliferation of unique and redundant data distributed among hundreds of computer applications and databases running on multiple platforms. As a result, data is difficult to share, costly to assemble, and hard to assess in terms of integrity and accuracy.

There is an increasing need to share information externally with domestic air carriers, international civil aviation administrations, Congress, and the flying public. For example, collaborative decision making (CDM) between airlines and the FAA is a central component of reducing future aviation delays in the presence of expected growth. CDM allows airlines and the FAA to respond jointly to rapidly changing weather and airspace traffic flow conditions based upon the shared availability of real-time flight data. CDM depends on new types of information and better access to it. The fact that current systems represent shared data, such as aircraft position, in unique ways impedes information sharing needed for CDM. The implementation of this FAA data management program and the data standards required for CDM is important to sustaining the agency's mission.

There is a general agreement within the agency that database and related system development cannot continue to follow the approach of the past. Various LOBs have undertaken the development of data management programs to consolidate, standardize, and increase accessibility to their data. While these efforts are an important and positive step, they do not encompass an agency perspective on data management. Future development must be built upon cross-organizational coordination, information sharing for best practices, inclusion of all internal or external customer needs, and standard processes and methodologies.

Finally, as a part of recent Federal critical infrastructure initiatives, the FAA is placing increased emphasis on information security. A sound data management program enables effective information security by helping to identify business rules, data ownership, and other protections that govern the human and automated handling of aviation data.

5 Guiding Principles

FAA data is viewed by all levels of the organization as a corporate resource used to make informed business decisions. As such, it is made available in a timely, easily accessible, and understandable format to all systems and users who need it. Core data is standardized across applications to allow for interoperability and increased accuracy. Maintenance costs of existing systems are reduced through elimination of redundancies and retirement of obsolete data, and development costs of future systems are reduced

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through data reuse. Data development is accomplished in coordination with other LOBs and in accordance with a standardized methodology. The agency employs a life-cycle management approach to databases, data, and related systems from creation to disposition. The Office of the Assistant Administrator for Information Services and Chief Information Officer (AIO) serves as a focal point for corporate data management activities.

6 Program Focus

Although LOB representatives, Congress, and data management experts agree that the FAA should implement a corporate data management program, research indicates that few public or private organizations have successfully done so. Most efforts start with sweeping statements about establishing data standardization, corporate data models, repositories, dictionaries, and policies and procedures. These efforts eventually fail, however, because they are too broad in scope, lack commitment, and grossly underestimate development and maintenance resource requirements.⁵ The FAA data management program, therefore, needs to be narrowly focused on the areas with the greatest potential benefits for the agency. Moreover, since the agency is operating within a very constrained financial environment with many conflicting priorities, the program must recognize and work within overarching agency priorities. The process should be evolutionary with emphasis on collaboration where it makes sense, standardization on core data elements, better communication along the information chain, and discrete projects that address the areas of greatest need.

7 Program Scope

At a minimum, this strategy should address the following fundamental questions concerning the FAA data and information environment:

- How many databases exist and what is the nature and quality of the data contained therein (to identify redundancies, gaps and non-standardization);
- What are the core data elements (these are defined as those data elements that are shared across organizational lines and represent the greatest data needs of the agency and its customers);
- How can data be shared in a timely manner;
- Where do the greatest data problems exist;
- What is the cost of gathering and maintaining existing data;
- What are the hidden costs to ongoing operations and new development caused by unknown, inaccessible, or non-standard data; and

⁵ Excerpts from presentation by Graeme Simsion of Simsion Bowles & Associates made at the Data Management International Symposium, Atlantic City, NJ, Tuesday, April 20, 1999.

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- Where are successful data management initiatives being implemented in the agency, and how can they be leveraged to move us forward.

The above analysis should raise the visibility of the data management function in the agency by focusing executive decision-making in the following critical areas:

- Standardization of selected core data elements,
- Establishment of a single point of accountability for each core data element,
- Establishment of requirements for greater data accuracy and sharing,
- Establishment of requirements for coordination of new database development,
- Establishment of an executive-level forum for data management issues,
- Facilitation of communication among internal and external data users and data providers,
- Training requirements for data quality and management issues,
- Elevation of data management to view data as a corporate asset and the current owners of data as stewards, and
- Increasing the availability and timeliness of data where needed.

8 Program Oversight

The Assistant Administrator for Information Services and Chief Information Officer (CIO) reports directly to the Administrator. Accordingly, he is uniquely positioned and chartered to facilitate the necessary internal and external collaboration, and serve as a clearinghouse for corporate data management issues. It is not the CIO's intent to manage individual projects or systems, or become another layer of review for systems development. Rather, the CIO will establish mutually agreed upon data standards and development methodologies, identify common tools, provide expertise to LOBs, and provide LOBs the corporate perspective. The CIO will also work with external customers to facilitate identification and translation of their data management requirements for the FAA, and communication of the agency's requirements to them.

The LOB's will work with the CIO to implement this Data Management Strategy and subsequent program.

9 Goals and Objectives

9.1 Goals

The primary goal of the FAA data management program is to make reliable information available quickly⁶ to support and enhance the agency's mission to ensure safe, secure and

⁶ Draft FAA IT Strategic Plan

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efficient air transportation for all users of air traffic control systems. The specific goals needed to achieve this are:

- Establish a corporate data management program managed by AIO;
- Increase data sharing;
- Improve data availability in terms of timeliness, access, and quality;
- Promote collaboration on data management activities;
- Establish a corporate data architecture;
- Leverage the existing data infrastructure.

9.2 Objectives

The following are the summary objectives for a three-phase FAA data management program. Each of these objectives represents a separate timeline within an integrated project plan. A map of each of these objectives to their respective goals is contained in Appendix B. In the near-term, FAA has committed to update Congress on our progress in establishing a FAA data management program. The agency will carry out a three-phased approach to establishing and sustaining a data management program. At the end of phase three, data management will be a fully operational program within the FAA.

9.2.1 Phase I Objectives (04/99 – 09/00):

- Obtain consensus and support from the LOBs on a FAA Data Management Strategy.
- Develop program costs and obtain funding.
- Start a process to identify and standardize selected core data elements for external customers.⁷
- Identify and publish current data management activities within the LOBs.
- Report to Congress semi-annually on status of FAA data management program.
- Identify, adopt, and develop proficiency with interoperable data management tools.
- Develop performance metrics⁸.
- Establish a forum for resolving data management issues.
- Establish an inventory of databases.
- Start implementing a corporate data management program based on the Strategy.

9.2.2 Phase II Objectives (10/00 – 09/01):

- Expand data standardization to include selected core data elements for internal customers.⁹

⁷ These are defined as the data most often requested by external customers.

⁸ This effort includes defining performance and quality measures for information and data, measuring existing information and data quality, and establishing performance targets for improving information and data quality. Performance and quality metrics can involve data management costs, information value measures, technical quality against stated standards, and availability measures.

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- Establish data integrity and accuracy for core data elements.
- Establish policies and procedures that will provide a framework for coordinating data maintenance and systems development activities with a corporate perspective.
- Establish a pre-acquisition database certification process for new development.
- Influence major acquisitions to use data standards in program development.
- Change the paradigm to view data as a corporate resource, where providers of data are considered stewards, and users are considered customers.
- Where economically feasible, develop interfaces to legacy systems data for greater interoperability and data reuse.
- Where cost effective, begin to identify and retire obsolete data.
- Establish a FAA metadata repository.
- Identify data that needs to be shared agency-wide.

9.2.3 Phase III Objectives (10/01 – 09/03):

- Enhance the FAA metadata repository to provide a comprehensive corporate reference.
- Influence major acquisitions to reduce database development costs.
- Where cost-effective, continue to identify and retire obsolete data to reduce database maintenance costs.
- Complete development of a coherent data management program to provide timely, accurate, and accessible data.
- Establish a process or system for making shared data available in a timely manner.

10 Implementation Strategies and Approaches

The following are general strategies or approaches that can be employed to achieve the objectives. The strategies are categorized into seven primary data management program functions. A mapping of these program functions to the objectives is contained in Appendix C. The program functions are:

- Data Management Program Implementation
- Data Sharing
- Data Availability
- Communications
- Corporate Data Architecture
- Leveraging Existing Systems and Methodologies
- Data Life-Cycle Management

⁹ These are defined as the data most often shared or needed across organizational lines.

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10.1 Data Management Program Implementation Strategy

The Office of the CIO will serve as the focal point for the FAA data management program. The Information Management Division, AIO-300, will be the lead unit for implementation, and will promote and sponsor the data management program. The primary focus of this strategy will be to deal with corporate data issues, facilitation, and policy development.

Senior managers in the various LOBs view data as a vital resource on the same level as people, facilities, or funding. As such, they are proactively involved in supporting the corporate data management program and implementing sound data management practices within their LOBs.

10.2 Data Sharing Strategy

Agency-wide core data elements that need to be shared will be identified and standardized. Core data elements will be selected for external and internal customers. For external customers, these are defined as those elements that are most requested and have the highest visibility. For internal customers, these are defined as those elements that are most frequently used by multiple LOBs. The complete information chain for these data elements will be analyzed and all stakeholder, customer, and provider requirements defined. These core data elements will provide the initial components for the corporate data model, and repository. Implicit in this strategy is the establishment of an orderly process for the creation, modification, validation, publication, retirement, and management of corporate data standards. It should be noted that this strategy does not envision making modifications to legacy systems solely for the purpose of data integration and standardization. Rather, integration or standardized data will generally be accomplished during the upgrade of legacy systems or the development of new systems. With regard to the latter, processes will be established to ensure that the appropriate requirements to accomplish the migration toward data standardization are included in the acquisition baseline.

10.3 Data Availability Strategy

Mechanisms and infrastructure are established to make data that needs to be shared available in a timely and secure manner to all users who need it. These mechanisms and infrastructure will develop, maintain, and provide access to the agency data, data architecture, data models, and data standards.

10.4 Communications Strategy

In recognition of data as a key resource, the FAA will establish a Data Management Forum under the auspices of the Joint Resources Council. The Data Management Forum will serve as a clearinghouse for corporate data management issues, establish standards

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for database development tools and methodologies, establish standards for data warehousing tools and methodologies, and establish and manage the database certification process. The CIO or his designee will chair the Data Management Forum, and each LOB will provide a managerial and technical representative to this group. In this regard, the Data Management Forum may choose to establish a Technical Working Group to advise the Data Management Forum on technical issues. The Forum will establish threshold criteria for the data that is to be reviewed.

The Information Management Division, AIO-300, will review current data management initiatives throughout the agency, identify best practices, and disseminate this information for use by all LOBs. AIO-300 will also review key areas or processes to ensure that all parties in the information chain are communicating with each other effectively.

10.5 Corporate Data Architecture Strategy

A corporate data architecture will be built around the core data elements. This architecture will evolve over time to incorporate additional data elements as deemed appropriate by the Data Management Forum. Implicit in this strategy is adoption of interoperable data management tools, standard methodologies, and performance metrics. AIO-300 will oversee the corporate data architecture and all associated processes and activities.

10.6 Leveraging Existing Systems and Methodologies Strategy

Data elements in mission critical legacy systems are cataloged using automated data management tools and a corporate metadata repository is developed from this information. Statistical analysis is performed on data usage rates, and redundant and obsolete data is identified and reviewed for elimination where feasible. The repository must be referenced prior to developing a new database application to ensure that the data does not already exist.

Best practices within the LOBs are identified and, where deemed appropriate and feasible, expanded for agency-wide use.

10.7 Data Life-Cycle Management Strategy

A life-cycle management approach is adopted for all agency data from defining the business need, through database development, implementation, usage, and obsolescence. All new IT acquisitions are reviewed by the Data Management Forum for database development activities. Proposed new databases are certified as having complied with the requirements to:

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- Review the current environment and standards to ensure that like data does not already exist;
- Consult with all stakeholders and customers during requirements development;
- Apply the approved standard tools and methodologies for development;
- Establish a data steward who is responsible for managing the data throughout its life cycle; and
- Implement appropriate information security at all phases of the development life-cycle in accordance with PDD-63.¹⁰

Where feasible, integration of standardized data is addressed as part of the normal maintenance and upgrade of existing systems and the development of new systems.

11 Leveraging Agency Best Practices

As discussed, several LOBs have implemented elements of a data management program. Many of these represent “best practices” that should be leveraged by the agency for the corporate data management program. These initiatives can serve as an example for other LOBs to follow in implementing data management practices, or in some cases, provide a successful process or system that could be expanded to incorporate other organizations. Our research identified the following activities or systems that should serve as models for the agency.

11.1 FAA Airports Management Information System (FAMIS)

FAMIS is an integrated and flexible system for the Airports organization and its customers that provides quality information for efficient decision making and the ability to measure the effectiveness of the airport system. FAMIS represents the automation of many of the business functions currently performed manually by the FAA Office of Airports. Contributions to the efficiency of the Airports funding process include:

- *Removal of the requirement for duplicative entry of information in the system-* Integration reduces the total time required to enter information, and creates additional savings by reducing the need for review and management of potentially conflicting data.
- *Validation of planning and programming funding levels according to funding type-* FAMIS provides the ability to validate the funding levels estimated for projects, and the ability to track those funding estimates from initial conceptual levels to submitted bids. This will provide valuable detail on the planning and execution effectiveness of grant recipients.

¹⁰ Presidential Decision Directive/National Security Council-63, “Critical Infrastructure Protection”

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- *Benchmarking of estimate*- The comparison of grant estimates from different locations around the country and even within single regions will provide a useful lever to ensure consistency and accuracy in project cost estimation.

Extensibility of other functions- The completion of FAMIS will provide the basis for further integration both within the Airports organization, and with other FAA organizations.

11.2 FAA National Aviation Safety Data Analysis Center (NASDAC)

The FAA promotes the open exchange of safety information in order to continuously improve aviation safety. To further this basic objective, the FAA has established the National Aviation Safety Data Analysis Center (NASDAC). NASDAC works with 23 different sources of data to provide access to integrated safety-related information and data collected by both U.S. and foreign government agencies and commercial vendors. Examples of the types of information available in the NASDAC system are accident data, incident data, aircraft-specific information, international safety recommendations, safety trend analysis, and airport and navigational aids. A diverse NASDAC user community includes FAA analysts, NASA, specialists in academic environments, and aviation consulting groups. The NASDAC provides:

- A centralized repository of aviation safety databases with comprehensive metadata,
- A library of aviation safety studies and reference materials,
- Local and wide area network access,
- Internet and Intranet access,
- A suite of data access, analysis, and retrieval software,
- On-site technical and analytical support personnel,
- An advanced data architecture in development, and
- Automated data standards implementation.

11.3 Airway Facilities Corporate Information Management System (CIMS)

CIMS supports the Air Traffic Services (ATS) mission through corporate information management that reduces workload, supports decision processes, and maximizes return on investment that is necessary to provide information to ATS decision makers. The products and services associated with the CIMS Program involve collecting and maintaining data from disparate, existing systems within ATS, cleaning up, standardizing, and unifying the data by applying business rules, and providing the new non-redundant data to customers' ATS-wide information systems for use by ATS executives and staff. The CIMS Program products and services include:

- *ATS National Data Center (NDC)* – the centralized data repository containing ATS corporate data and metadata. Its purpose is twofold: (1) to provide decision support information to executive management and (2) to provide cleansed, analyzed and

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transformed data to ATS customers and information systems. The NDC consists of two major components: a Metadata Repository containing the Corporate Data Dictionary and metadata for ATS NAS support systems, and the Corporate Database containing unified corporate data to be shared by ATS information systems;

- *ATS Data Administration (DA) Program* – the services applied to improving the structure, accuracy, validity, timeliness, and accessibility to data to enable ATS-wide data standardization, integration and interoperability;
- *ATS Executive Information System (EIS)* – an information system designed specifically for ATS executives that provides a near real-time display of the current status of the National Airspace system (NAS), and summary reports of facility performance data. Currently, two separate systems exist: the Airways Facilities EIS and the Air Traffic EIS. For discussion purposes, these systems are collectively referred to as the ATS EIS;
- *Regional Information System (REGIS)* – an information system that enables regional managers and staff to manage and track programmatic and budget information in real time, and draw data from the NDC for regional use;
- *NAS Support Operations Center (NSOC)* – the physical facilities, computers, and related equipment that house the NDC and the ATS Executive Information Systems;
- *NAS Support Integration Process (NSIP)* – the quality control analysis process for system architecture and system engineering activities. NSIP promotes the integration of existing and developing AF information system assets into the CIMS architecture.

11.4 NAS Information Architecture Committee (NIAC)

The NIAC, which has held regular monthly meetings since 1997, provides an agency-wide technical forum on data management topics. Six NIAC working groups are addressing complex areas of future NAS data standards, such as geospatial and site adaptation data. The NIAC has established a collaborative and constructive environment that promotes aviation interest on data management. The NIAC could be the basis for the Technical Working Group that advises the Data Management Forum. In this regard, the NIAC charter would be revised to encompass this expanded role.

11.5 Aviation Data Description Registry (ADDR)

The ADDR, which is currently under development by NIAC, is a comprehensive, authoritative source of reference information about aviation data. It is not the aviation data itself, but rather the information that helps describe the data. The ADDR serves as the clearinghouse for data by providing information on the definition, origin, source, and location of aviation data. When used in conjunction with an aviation information

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database, the ADDR enables users to better understand the information they are accessing. It also serves as a tool to support the FAA's four step standard-setting process, to record and disseminate these standards, and ultimately to facilitate data sharing between organizations and users. These four steps comprise the National Airspace System (NAS) Information Interoperability Process, as follows:

- *Information Requirements Definition* - Conduct collaboration among domain experts to determine common information requirements.
- *Aviation Data Description Registry (ADDR)* - Capture requirements, relationships, and rules in the ADDR, and generate testable coded object models.
- *Implementation and Validation* - Test and validate objects in a distributed NAS application testing environment to demonstrate their interoperability.
- *Registration and Public Access* - Register validated objects and publish standardized models and definitions through the FAA Acquisition Management System's Acquisition Support Toolset.

11.6 NAS Architecture

The NAS Architecture provides a "living" representation of an integrated and evolutionary approach to NAS modernization. The NAS Architecture creates an integrated database that contains all costs (research, capital, and operations), schedules (system life cycle), and interdependencies (people, systems, and support activities), in order to sustain existing operations and deliver new capabilities.

The data in the NAS Architecture is accessed through the Capability and Architecture Tool Suite (CATS). CATS consists of a suite of integrated commercial, off-the-shelf software products configured with custom applications to provide decision support and systems engineering support necessary to document the NAS Architecture. CATS provides users with multiple viewpoints into the architecture with regard to:

- *Geography* – regional center facility,
- *Phase of flight* – (e.g. arrival departure, cruise, surface, pre-flight),
- *Technical domain* – (e.g. automation, surveillance, communications),
- *Service* – (e.g. flight planning, separation assurance, strategic flow), and
- *Organization* – (e.g. Integrated Product Teams, Air Traffic Services).

The Architecture and the CATS systems are based on a delivery of service paradigm. This results in a focus on capabilities and the implementations to provide those capabilities. With implementations (systems, procedures, training, certification) as the backbone of the data, each view will also provide interdependencies between organizations, systems, funding and schedules.

CATS utilizes commercial off-the-shelf applications to provide required functionality. Where needed, these applications have been enhanced through custom development and integration.

11.7 Safety Performance Analysis System (SPAS)

SPAS is a computer-based system that provides analyses of current and historical aviation-related data. SPAS relies on numerous internal (to the FAA) and external databases containing information on thousands of air operators, air agencies, aircraft, and air personnel. SPAS enables the FAA to monitor the status of aging aircraft, track the growing number of aircraft operations, and increase industry accountability for aviation safety. The primary objectives of SPAS are to:

- Provide an efficient and effective mechanism for Flight Standards to analyze safety critical performance indicators and to retrieve underlying data;
- Assist inspectors in identifying certificate holders that may present a greater safety risk, thus warranting further surveillance; and
- Assist in establishing and updating the work elements of the surveillance program.

Appendix A: Definitions

Application – A name given to an arbitrary collection of business functions, entities, programs, and elements.

Data – A noun that refers to things known or assumed; facts or figures from which conclusions can be inferred; or information.

Data Architecture – The data architecture depicts the distribution and access mechanisms associated with data for one or more applications. It defines the standards and procedures needed to create consistent, accurate, complete, and timely data. It defines a process for rationalizing data needs across applications and determining its appropriate distribution and placement. It defines the methods for the collection and distribution of all computerized information.

Data Dictionary – A database for holding definitions of entities, elements/attributes, views, relationships, and other data that describes the structure of a database.

Data Element/Attribute – One or more elements describe an entity, and the values of those elements describe occurrences of the entity. It defines one of the pieces of information held about an entity.

Data Management – The process of (program for) applying a standard methodology and readily accepted principles and practices to the creation, collection, storage, retrieval, and conversion to usable business information of organizational data.

Data Model – A representation of the things of significance to an enterprise and the relationships among those things. It portrays the underlying structure of the enterprise's data, so this can then be reflected in the structure of databases built to support it.

Data Repository – A repository is similar to a database and data dictionary, however, it usually encompasses a comprehensive information management system environment. It includes descriptions of data structures (i.e. entities and elements), and may also include metadata of interest to the enterprise, data screens, reports, programs, and systems. Typically it includes an internal set of software tools, a database management system, metadata, and loading and retrieval software for accessing repository data.

Data Steward – A data steward has the role of surrogate owner of a data element or entity for an enterprise. A data steward provides the definition and parameters of a data element or entity for the enterprise.

Data Warehouse – A database system that is optimized for the storage of aggregated and summarized data across the entire range of operational and tactical enterprise activities.

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The data warehouse brings together several heterogeneous databases from diverse sources in the same environment. This could include data from current systems, legacy sources, historical archives, and other external sources.

Database – A collection of data items that have constraints, relationships, and a schema. A collection of interrelated files stored together, where specific data items can be retrieved by various applications. A collection of data arranged in groups for access and storage.

Database Development – Process of creating a database by applying a standard methodology for defining user requirements for, modeling, designing, developing, testing, and implementing a database application to satisfy a business need.

Entity - A thing of significance about which the organization wishes to hold information.

Information Chain – The process whereby data is created, collected, stored, retrieved, and converted to the information needed to conduct the business of an organization.

Metadata - Simply put, is data about data. It describes information about objects being manipulated. Examples of metadata include data element descriptions, data type descriptions, attribute/property descriptions, range/domain descriptions, and process/method descriptions. Ideally, the repository environment encompasses all corporate metadata resources: database catalogs, data dictionaries, and navigational services. Metadata includes things like the name, length, valid values, and description of a data element.

Platform – Refers to the computer hardware on which the database is stored or resides.

Standardization – Process of requiring application of a standard definition and representation to a data element.

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Appendix B: Mapping of Strategic Goals to Objectives

OBJECTIVES	STRATEGIC GOALS					
	Establish a corporate data Mgmt. program managed by AIO	Increase data sharing	Improve data availability in terms of time-ness, access, and quality	Promote collaboration on data management activities	Establish a corporate data architecture	Leverage the existing data infrastructure
Phase I Objectives:						
Obtain consensus and support for a FAA Data Management Strategy.	X					
Develop program costs and obtain funding.	X					
start a process to identify and standardize selected core data elements for external customers.		X	X			
Identify and publish current data management activities within the LOBs.			X	X		X
Report to Congress semi-annually on status of FAA data management program.	X					
Identify, adopt, and develop proficiency with interoperable data management tools.					X	
Develop performance metrics.		X	X		X	
Establish a forum for resolving data management issues.				X		X
Inventory existing databases.					X	X
Start implementing a corporate data management program based on the Strategy.	X					
Phase II Objectives:						
Expand data standardization to include selected core data elements for internal customers.		X	X			
Establish data integrity and accuracy for core data elements.			X			
Establish policies and procedures that will provide a framework for coordinating data	X				X	X

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OBJECTIVES	STRATEGIC GOALS					
	Establish a corporate data Mgmt. program managed by AIO	Increase data sharing	Improve data availability in terms of time-liness, access, and quality	Promote collaboration on data management activities	Establish a corporate data architecture	Leverage the existing data infrastructure
maintenance and systems development activities with a corporate perspective.						
Establish a pre-acquisition database certification process.		X	X			
Influence major acquisitions to use data standards in program development.		X	X	X		
Change the paradigm to view data as a corporate resource, where providers of data are considered stewards, and users are considered customers.	X			X		
Where economically feasible, develop interfaces to legacy systems data for greater interoperability and data reuse.						X
Where cost-effective, begin to identify and retire obsolete data.			X			X
Establish a FAA metadata repository.		X	X		X	X
Identify data that needs to be shared agency-wide.		X	X			
Phase III Objectives:						
Enhance the FAA metadata repository to provide a comprehensive corporate reference.					X	
Influence major acquisitions to reduce database development costs.		X	X	X		
Where cost-effective, continue to identify and retire obsolete data to reduce database maintenance costs.			X			X
Complete development of a coherent data management program to provide timely, accurate, and accessible data.	X	X	X	X	X	X
Establish a process or system for making						

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OBJECTIVES	STRATEGIC GOALS					
	Establish a corporate data Mgmt. program managed by AIO	Increase data sharing	Improve data availability in terms of time-liness, access, and quality	Promote collaboration on data management activities	Establish a corporate data architecture	Leverage the existing data infrastructure
shared data available in a timely manner.		X	X			

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Appendix C: Mapping of Program Functions to Objectives

OBJECTIVES	PROGRAM FUNCTIONS						
	Data Management Program Implementation	Data Sharing	Data Availability	Communications	Corporate Data Architecture	Leveraging Existing Systems and Meths.	Data Life-Cycle Management
Phase I Objectives:							
Obtain consensus and support for a FAA Data Management Strategy.	X						
Develop program costs and obtain funding.	X						
Start a process to identify and standardize selected core data elements for external customers.		X					
Identify and publish current data management activities within the LOBs.				X			
Report to Congress semi-annually on status of FAA data management program.	X						
Identify, adopt, and develop proficiency with interoperable data management tools.					X		
Develop performance metrics.	X	X	X		X		
Establish a forum for resolving data management issues.				X			
Inventory existing databases.						X	X
Start implementing a corporate data management program based on the Strategy.	X						
Phase II Objectives:							
Expand data standardization to include selected core data elements for internal customers.		X					
Establish data integrity and accuracy for core data elements.		X					
Establish policies and procedures that will provide a framework for coordinating data maintenance and systems development	X						

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OBJECTIVES	PROGRAM FUNCTIONS						
	Data Management Program Implementation	Data Sharing	Data Availability	Communications	Corporate Data Architecture	Leveraging Existing Systems and Meths.	Data Life-Cycle Management
activities with a corporate perspective.							
Establish a pre-acquisition database certification process.							X
Influence major acquisitions to use data standards in program development.							X
Change the paradigm to view data as a corporate resource, where providers of data are considered stewards, and users are considered customers.	X						
Where economically feasible, develop interfaces to legacy systems data for greater interoperability and data reuse.						X	
Where cost-effective, begin to identify and retire obsolete data.							X
Establish a FAA metadata repository.		X	X		X	X	
Identify data that needs to be shared agency-wide.		X	X				
Phase III Objectives:							
Enhance the FAA metadata repository to provide a comprehensive corporate reference.					X		
Influence major acquisitions to reduce database development costs.							X
Where cost-effective, continue to identify and retire obsolete data to reduce database maintenance costs.							X
Complete development of a coherent data management program to provide timely, accurate, and accessible data.	X	X	X	X	X	X	X
Establish a process or system for making shared data available in a timely manner.		X	X				